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ABSTRACT

C. Perrow's research has suggested that analyzing organizations according to technology (or process) and raw material (or outcome) can provide valuable information about organizational communication behaviors and patterns. His scheme for classifying organizations suggests a continuum that places organizations with "variable" technologies (unanalyzable with unstable outcomes) at one extreme, "comparable" organizations (average variability and stability) in the center, and "routine" organizations (analyzable technology and uniform outcomes) at the other extreme of the continuum. To determine the validity of this system of classification, the International Communication Association's Communication Audit was administered to three organizations representing the three types on the continuum. The audit elicited information from employees of the three organizations concerning (1) information received, (2) information sent, (3) follow up activities, (4) sources of information, (5) timeliness of information, (6) communication relationships, (7) organizational outcomes, and (8) channels of information. The results showed significant differences between the two organizations at either end of the continuum, lending support to the contention that organizational structure and outcome have an impact on internal communication processes and indicating the value of Perrow's scheme in analyzing communication data from technologically diverse organizations. (FL)

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A COMPARATIVE ANALYSIS OF ORGANIZATIONS' COMMUNICATION STRUCTURE: ORGANIZATIONAL TECHNOLOGY AND OUTCOMES AS DETERMINANTS OF INTERNAL COMMUNICATION

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A COMPARATIVE ANALYSIS OF ORGANIZATIONS' COMMUNICATION STRUCTURE: ORGANIZATIONAL TECHNOLOGY AND OUTCOMES AS DETERMINANTS OF INTERNAL COMMUNICATION[1]

Audits of communication have been conducted during the past decade in a variety of organizational settings including industrial, educational, health care, and governmental. (Eadie, Goyer, Liebowitz, & Spiker, 1980; Terlip, 1980; Werner, Falcione & Temkiewicz, 1978) Researchers have often compared these results across a variety of organizations in an attempt to generalize results and broaden the theoretical base from which we draw conclusions about organizational behavior (Burhans, D., 1972, and Dahle, 1954). For example, the ICA audit data bank has been used for multiple comparisons (see: Brodzynski & Christenson, 1981; Daly, Falcione, & Damborst, 1979; Falcione, Goldhaber, Porter, & Rogers, 1979; and Goldhaber, Yates, Porter, & Lesniak, 1978). At times the results have been confusing and nonproductive. We have not yet clearly identified unique differences, attempted a classification system for types of organizations, or begun to make predictions about communication under different structures. Are there unique qualities about the structure and/or nature of the organizational outcomes that will influence the communication system? Shouldn't we expect that the structure and outcome of an industrial organization, for example, will change the information flow as compared to the structure and outcome of an educational organization?

THEORETICAL DEVELOPMENT

Perrow's work (1967) suggests an analysis of organizations according to technology (or process) and raw material (or outcome). The impact of these two variables on the internal state of the organization, principally communication, is significant enough to warrant a comparison of communication across Perrow's organizational types.

Perrow provides a basis for organizational analysis while using existing theories of organizational behavior. His perspective is based on four characteristics: 1) technology, or the work done in the organization, is the defining characteristic of organizations (organizations are seen as systems for getting work done), and technology is an independent variable, 2) structure, or the arrangement among people for completing work, is a dependent variable, 3) the organization should be conceptualized holistically, and 4) technology is a better basis for comparing organizations than present schemes.

Technology is defined as actions that an individual performs upon an object (with or without tools) in order to make some change in the object. Raw material may be a living being (human or otherwise), a symbol, or inanimate object. The interaction of individuals is the organizational structure.

Technology is examined from two perspectives: the number of exceptional cases encountered or familiarity/unfamiliarity of cases and the nature of the "search" process undertaken by individuals when exceptions occur. One search process is logical and analytical and another is vague and unanalyzable.

The second basis for analysis is the raw material used by the organization. The characteristics of the raw material are likely to determine what kind of technology will be used. Perrow looks at raw material from two perspectives: the level of understanding about the raw material (how well the organization understands its raw material will determine how able they are to control it and achieve more predictability and efficiency) and secondly, the stability/variability of the material (can it be tested in a standardized fashion or is continued adjustment necessary?). These factors are interrelated. If organizations were placed on a continuum, they could be analyzed as "variable" to "routine" according to the following chart:

VARIABLE	COMPARABLE	ROUTINE
technology: unanalyzable unfamiliar	average level of stability/variability	technology: analyzable familiar
Raw Material: not well understood, unstable		Raw Material: well understood, uniform

Communication audits were administered under the same controlled conditions in three sample organizations: a variable organization according to Perrow's definition (Midwest Educational Organization); a comparable organization (Midwest Health Agency); and a routine organization (Midwest Restaurant Chain).

The Midwest Educational Organization (MEO) is classified as an organization with a "variable" technology and raw material. Educational institutions have been attempting for years to identify precisely "what makes a good teacher? How do you measure success?" While these organizations have come closer to stabilizing the "technology" they use and identifying their "raw material" (i.e. students) more clearly, they still are far from utilizing routine tasks such as manufacturing (Smith, 1980). This is contrasted with the Midwest Restaurant Chain (MRC) which moves to the other end of the variable-routine continuum where store managers are sent to the "corporation kitchen" to learn precise food preparation. Tight quality control over the raw material is maintained through food products, portion size, visual presentation of food, and service.

The Midwest Health Agency (MHA) is placed in the middle of these two based on the understanding and stability of the raw material used and the number of exceptions to the technology. This particular organization provides hospital based home health treatment which requires precise control over technology and raw material. At the same time, the application of this technology is so variable and used in such a wide range of health situations that there are many exceptions to the technology.

Because this organization represents one in which there is a unique blend of stability and variability, it was located in the middle range of the continuum (classified as "comparable"). Our intent is to determine if the technology and raw material of the organization have an impact on the internal communication system.

METHOD

The ICA Questionnaire Survey instrument, as well as interviews and network analyses, were administered to employees in the Midwest Educational Organization with a return rate of 85% (61 responses), to employees in the Midwest Health Agency for a return rate of 89% (30 responses), and to the employees of the Midwest Restaurant Chain who returned 95% of the surveys (92 responses). This paper compares results across the eight component parts of the instrument: information received, information sent, follow-up activities, sources of information, timeliness of information, communication relationships, organizational outcomes, and channels of communication.

RESULTS AND ANALYSIS

Receiving Information from Others

The first component of the ICA Communication Audit Questionnaire Survey focuses on receiving information from others. Thirteen statements, ranging from "how well I am doing my job" through "specific problems faced by management," elicit responses on a five-step Likert-type scale where 1=very little, 3=some, and 5=very great. An individual's response to each statement is for one of two conditions: "this is the amount of information I receive now" or "this is the amount of information I need to receive." It is possible to develop comparisons based on the amount of information an individual perceives himself/herself as receiving and the perceived need for such information. To determine significance, correlated T-tests were performed on each pair of variables (receive vs. need)

within the Variable and Routine organizations. Porter (1979) reported an Alpha reliability of .86 on the "receiving information from others" scale, and .88 on the "needing information from others" scale.

Using Perrow's organizational continuum, Variable-----Routine, the authors examined the data from the three sample organizations. A summary of the data indicates that the Variable organization, MEO, has a mean of 2.91 for information received and a mean of 3.41 for information needed. The areas for which the employees need significantly more information than they receive ($p<.01$) are: "how decisions are made that affect my job," "specific problems faced by the District Office," "how I am being judged," and "how my job-related problems are being handled."

(Insert Table 1 here)

The Comparable organization, Midwest Health Agency, shows a mean of 2.78 on information received and a mean of 3.62 on information needed. The topic areas of most importance concern "career advancement," "specific problems faced by management," "how decisions are made that affect my job," "company failures," "important new program developments," and "how technological changes affect my job."

The organization used to illustrate the Stable end of the continuum, Midwest Restaurant Chain, has a mean of 3.10 on information received and 3.27 on information needed. The areas for which the employees need more information than they receive ($p<.01$) are: "promotion and advancement opportunities," "how I am being judged," and "how decisions are made that affect my job." (See Table 1)

When the examination of the data shifts from the responses within each organization to comparisons between the organizations at the two extremes of the continuum, the Midwest Educational Organization (Variable) and the Midwest Restaurant Chain

(Routine), an examination of the means indicate that the employees of the Routine organization receive more information than is received by the employees of the Variable organization. The T-tests for statements about the amount of information received are significant ($p<.01$) for two of the statements: "my job duties" and "specific problems faced by management."

(Insert Table 2 here)

While the majority of the remaining responses for this section on information received are non-significant, there is a trend in the direction of the Routine organization receiving more information than the Variable organization. This trend is in keeping with the original suggestion about the flow of information in the Routine organization. The authors suggest that the employees in the Routine organization receive more information because the information is more amenable to rapid dissemination throughout the organization. For instance, one of the significant differences occurs with information about how an individual is performing his/her job duties. In an organization where the tasks are subject to precise job analyses, it should also be possible to report to an employee how s/he is meeting the individual tasks that comprise an overall job assignment. In a restaurant, an employee can be shown the proper way to set the table, take a client's order, report the order to the cooks, etc. If there are deficiencies in the performance of these tasks, corrective action can be quickly specified. In contrast, a teacher may not receive specific feedback about his/her performance because the job is not well-suited to a job analysis and, therefore, it is difficult to indicate what is not being accomplished. Likewise, it is often hard to tell a teacher what s/he is doing correctly that results in a successful educational program or highly motivated students. Overall, this conclusion is consistent with Perrow's observation that the structure of an organization may result in more information being received in the Routine organization than in the Variable organization.

When the means of the two extreme organizations are examined, they suggest that the employees of the Midwest Educational Organization need more information than the employees of the Midwest Restaurant Chain. The greater amount of information needed may be attributable to the environment within an educational institution. T-tests of two statements on the Survey Questionnaire yield significant ($p<.05$) results: "mistakes and failures of my organization" and "new product or service programs." (Table 2) The MEO employees perceive a high need for information about these two areas. It is very difficult for an educational organization to determine when it makes a mistake or fails in some particular undertaking. Often a school district must wait for years, thousands of students, and dozens of standardized tests before it can accurately assess its level of performance. The inability of the MEO to provide its employees with sufficient information about its mistakes and failures is a result of the variable nature of its technology and raw material. At the same time, the constant changes in approaches to education make it difficult for the MEO to provide sufficient information about updates in technology or new programs.

Sending Information to Others

A second way to examine communication is by looking at the information an employee sends or believes needs to be sent. The second section of the Questionnaire Survey asks for responses to seven statements in two categories: "this is the amount of information I send now" and "this is the amount of information I need to send." The seven statements range from "reporting what I am doing in my job" to "asking for clearer work instructions." The statements present different kinds of information that can be sent, but all are related to an employee's own job with one exception, one statement looks at the evaluation of an employee's superior--"evaluating the performance of my immediate superior." Porter (1979)

reported an Alpha reliability of .80 on the items measuring "sending information now" and "need to send information."

The employees of MEO have a need to send slightly more information than they were actually sending at the time of the survey. With a mean of 2.63 on information sent now and a mean of 2.93 for information that needs to be sent, there is a difference of only .30. Within the information sent/need to send section, there are three statements that generate the most perceived need ($p<.05$): "evaluating the performance of my immediate supervisor," "reporting job-related problems," and "reporting what I am doing in my job."

(Insert Table 3 here)

It should be noted that the organization's custodial staff express the greatest need to send more information in all areas.

The MHA has a mean of 2.90 for information currently sent and a mean of 3.39 for information that needs to be sent. With a difference between means of .49, the MHA is definitely looking for ways to increase the number of its messages. Of the statements included in this section of the Questionnaire Survey, three are important to the agency's employees: "evaluation of my immediate superior," "requesting instructions about my work," and "reporting how I am doing in my job." An employee's physical location within the agency regulates the perceived need to send more messages. For instance, those employees in a "satellite" office have a stronger need for clarification on work instructions. Overall, the satellite personnel want to send messages at an average level of 3.23 while they send them at an average level of 2.48.

The Routine organization, MRC, reports a mean of 3.15 on information that is being sent and a mean of 3.02 on information that needs to be sent. This indicates a perceived need to send less information or, stated another way, the restaurant employees currently send more information than they think it is necessary to send.

The individual statement within this section of the survey that results in the greatest difference ($p<.01$) between send and need to send is concerning the evaluation of the immediate superior. (Table 3)

When the two anchoring organizations, MEO and MRC, are compared on information that is sent and information that needs to be sent, it is apparent that the Routine organization (MRC) sends more information to other levels of the organization than does the Variable organization (MEO). On five of the seven statements concerning the amount of information sent, the MRC employees sent significantly ($p<.05$) more information than the employees of the school. The statements for which there is a significant difference are: "reporting what I am doing in my job," "reporting what I think my job requires of me," "reporting job-related problems," "requesting information necessary to do my job," and "evaluating the performance of my immediate superior."

(Insert Table 4 here)

The results lend support to the assertion that the information flow within a Routine organization involves reporting daily activities and occurrences. The significant statements deal with job performance information. The exception is the evaluation on an employee's immediate superior, and even that is job related to the extent that one's supervisor contributes to the atmosphere of the work place. In contrast, the fact that the school employees do not send as much information as the Routine organization is interesting because of the stereotype that educational organizations deal with "paper." Since the responses do not indicate how the information is sent (verbally or written, etc.), it is not possible to conclude that the information is reaching the appropriate people by other means. Overall, the employees of the Variable organization are sending less information than the employees of the Routine organization.

The employees of both organizations perceive they need to send information at approximately the same levels. There are no significant differences reported between the two organizations on the amount of information that needs to be sent.

Follow-up on Information Sent

Additional survey questions assess the amount of action or follow-up that is completed by certain individuals within the organization and the amount of action that needs to be taken by those same individuals. The number of persons identified varies according to the hierarchical structure of an organization and the depth to which one wants to probe. For example, if a survey is conducted in a manufacturing plant, there may be few responses on amount of follow-up by subordinates because most assembly line employees do not supervise anyone; but, the number of responses about immediate supervisor action on information may be high for the same reason--a few supervisors who have many subordinates. In this section, the individuals are usually labeled according to their role with the administrative hierarchy, e.g., "subordinate," "co-worker," "immediate supervisor," "middle management," "top management," etc. The response continuum remains from 1 to 5 within the two categories of the amount of follow-up now and the amount of follow-up needed. Porter (1979) reported an Alpha reliability level of .80 on "follow-up now" and .57 on "amount of follow-up needed."

There is a higher degree of consistency across all organizations in reporting areas of need for this section of the Questionnaire Survey. The Variable organization reported means of 2.93 and 3.42 on follow-up now and follow-up needed respectively. The only level from whom more follow-up is desired ($p<.01$) is upper administration or the District Office.

(Insert Table 5 here)

The employees at the MEO have indicated a strong need to receive more information from the District Office. A mean of 2.36 for follow-up action is only above the low or "little" label at 2 on the scale. The employees want to receive at least a 3 or "great" amount of follow-up ($\bar{x}$=3.42) by the top administrator for the school district. Responses for all other levels (subordinates, co-workers, and immediate supervisor) are non-significant, thus suggesting that the amount of follow-up is at least acceptable.

The Comparable organization cited three areas with strong differences between the perceived and the desired levels of follow-up. The statements generated refer to follow-up by middle level administrators, immediate supervisors, and subordinates. The MHA employees feel very strongly that the administrators are not following up effectively. The responses are less intense for the immediate supervisor and co-workers. The desired levels would bring follow-up action to approximately the "3" or moderate level of response. Overall, the agency personnel report a difference of one-half a response scale (.49) between current action and needed follow-up. Such a level leads the authors to conclude that there is a strong need for more follow-up action to be taken on information in the Comparable organization.

The restaurant employees (MAC) report a mean of 2.98 for follow-up and a mean of 3.20 for needed action on information. The difference between the means is small--falling just to either side of the "some" or "moderate" mark (3) of the response scale. Between "have" levels and "need" levels, top management (Chief Executive Officer and staff) appear to need lessons ($p<.01$) in following-up on information generated from further down in the organization. (See Table 5) Means of 2.25 and 2.99 move from the "little" (2) level to the "some" (3) level. Again, the perceived need does not seem excessive, but does suggest that top management is removed from the information process in following up on the requests of the lower levels of the organization.

Given that there are internally perceived needs for follow-up only from the top administrators/managers of the two anchor organizations (MEO and MRC), it is not surprising that there are no reported differences between the two organizations on the eight items of follow-up now and follow-up needed. It appears that these organizations, although placed at opposite ends of the continuum in terms of their technology and outcomes, are similar in the ways in which their chief administrators handle requests for action.

Sources of Information

Not only is it important to know how much information an individual in an organization receives; but, it is helpful to know where the information comes from and whether more information from a particular source is needed. The fourth section of the Questionnaire Survey has as its subject area the sources of information within the organization. A "source" is distinguished from a "channel" in the questionnaire, although the common practice is to use the words synonymously. A channel is operationalized as the physical route a message takes--face-to-face contact, telephone, written memos, television, etc. A source is the originator of the information or the person from whom the information is heard--a co-worker, department meeting, top management, the grapevine, etc. The common factor for defining the source is the presence of an individual in the communication process.

As with the first twenty-five statements, the nine statements on sources of information provide categories for responses to information received now and need to receive. The purpose is to identify as many key sources within the organizational structure from whom an employee either receives or needs to receive more information.

Within the Variable organization there are the same number of initial sources of information as in the Routine organization--nine, but information needs are different. The mean for all statements asking about information received now

from sources is 2.85; the mean for information needed from the sources is 3.27. Employees in the MEO indicate that the greatest lack of information comes from five of the nine sources. The sources from whom there is an insufficient response ($p<.05$) are "co-workers in my building," "co-workers in other buildings," "immediate supervisor," "departmental meetings," and "top administration." It appears that the employees in the school are unable to utilize even their colleagues as sources of information. Once again, the District Office suffers as a link in the communication chain with its failure to provide more information for the school employees.

In support of the "bad press" often accorded the role of the grapevine in organizations, the school employees responded that they received too much information from the grapevine. The mean for information received is 3.14 (just above "some") while the amount desired is 2.51 or halfway between "little" (2) and "some" (3). The difference ($p<.01$) is indicative of a need for less information.

(Insert Table 6 here)

In contrast, the Comparable organization rate the immediate supervisor as the key source of information (3.63), with co-workers and staff meetings making a close second-place tie (3.61 and 3.60). Within the Variable organization no source is rated higher than 3.27 and that mean is for co-workers in an employee's own building. The grapevine was not considered either a key source or an accurate source of information in the agency.

Several parallels exist between the school and the restaurant with respect to differences perceived for information received and information needed from "top levels of management" and "co-workers in other physical locations." The Routine organization also perceives the need for more information from "middle management," through "formal management presentations," and from "subordinates."

With summary means of 2.83 for information received and 3.05 for information needed from specific sources, the employees of the restaurants are the only ones who report needing less information overall. These results suggest that information flows more freely from some sources in a Routine organization. Discrepancies do exist between information received and needed for several specific sources ($p<.05$). Top management apparently fails to get as much information down into the organization as employees want. This is similar to the need of employees in the Variable organization, although the level of need is not as great. Middle management also falls short in providing information, as do subordinates. Co-workers in other physical locations need to send more information. Finally, the formal presentations made by management do not provide as much information as the employees want to receive from them.

The grapevine again comes under attack as a source of too much information ($p<.01$) in the Routine organization. Employees reported needing only "a little" information from the grapevine while they also reported receiving a "great" amount. Not only do employees receive more information from the grapevine, but they also receive sufficient amounts ($p<.05$) of communication from their same-store co-workers. (See Table 6)

Turning to the comparison of the two organizations (MEO and MRC), it is apparent that the employees of the MRC receive more information ($p<.05$) from their immediate supervisors and department meetings than do the MEO employees. The restaurant employees also receive significantly ($p<.01$) more information from the grapevine. It is possible that the Routine organization provides more training for their supervisors in providing feedback to their employees, or at least provides them with the opportunity to share information with their subordinates. Employees in the MRC (Routine organization) also seem to derive more information from the departmental meetings than do the MEO (Variable organization)

employees. The setting for the Routine organization's meetings may be less contentious because the employees use these meetings to discuss the weekly progress of the organization, etc. The school employees (or the Variable organization) are more likely to attempt to use the meetings as a forum for advocating changes in the process or structure of the organization; therefore, the individuals may perceive them as less valuable as sources of information. While top management has been targeted for failing to communicate effectively with the rest of the organization, their formal presentations are well-received as sources of information when compared with the presentations made to the MRC employees. As reported earlier, both organizations feel that the grapevine provides too much information. In comparing the two organizations, the Routine organization receives an even greater amount of information from the grapevine than does the Variable organization. The work environment may be more conducive to the development of a grapevine in the Routine organization where information moves from immediate supervisors effectively but not from levels above him/her. As discussed in the next section concerning the timeliness of information, the employees in the Routine organization may need the information from the grapevine more than the Variable organization's employees.

(Insert Table 7 here)

Only one statement of perceived need for more information, "from other departments/buildings in my organization," resulted in a significant ($p<.01$) difference between the two organizations. (Table 7) The MEO employees need to receive more information from the other people with whom they work but from whom they are geographically separate.

Timeliness of Information Received from Key Sources

While nothing in the Questionnaire Survey asks respondents to rank order the sources by importance, it does provide an opportunity for employees to indicate the timeliness of information from the various sources. Using the "very little" to "very great" (1-5) response continuum, respondents can indicate if the information is there when it is needed. The sources being evaluated are subordinates, co-workers, immediate supervisors, middle management, top management, and the grapevine.

The Variable organization reports means ranging from 3.34 for the timeliness of information from the immediate supervisor to 2.76 for information from the District Office. The overall mean for timeliness of information from all sources is 3.11 or just above the "some" response level. By comparing the timeliness of information with the amount of information received or needed from that source, it is possible to draw a more accurate picture of the functional levels of the sources. It is apparent that while the information is generally timely ("some" or 3) there is a perceived need for more of it from every source except the grapevine. For example, the employees want more information ($p < .01$) from immediate supervisors even though its timeliness is above the "some" mark (3.34) and from the District Office. The information communicated from the District Office is less than timely.

The Comparable organization reports an overall mean of 3.44 for information that is timely. Means range from 3.03, for the supervisor's boss to 3.78, for co-workers. Generally, messages are judged as moderately timely (3) for the entire agency. Co-workers apparently provide the most timely information at a mean just slightly less than "great" (4) on the scale.

In the Routine organization, the information is slightly less timely than for the MEO or MHA. The reported means range from 3.71 for timeliness of information from immediate supervisor to 2.05 for top management. In looking at the sources

compared with the timeliness of information, there is a relationship between the two sections. Since the response level for immediate supervisors is so high (almost "great" or 4), there is no significant difference in the information received and needed from that source. For the next most highly ranked sources--co-workers and the grapevine--the level of timeliness is above the moderate or "some" rating. For the same sources, there is a reported ($p<.05$) need for less information. The information received is timely but more than sufficient. For the remaining sources--subordinates, middle management, and top management--the timeliness responses are all less than "some" or moderate levels of information and, compared with the results for information received or needed, less than adequate in providing the necessary information to the employees.

Comparisons of the two organizations, the Midwest Educational Organization and the Midwest Restaurant Chain, reveal only two of the five sources of timely information as significantly different. The MRC receives more timely information ($p<.05$) from the immediate supervisor than does the MEO. This result is consistent with the earlier reports of more effective communication from the immediate supervisors in the Routine organization. The immediate supervisors are able to send more information to their subordinates, be used more frequently as a source and are also seen as a timely source of information. Top administration is performing much better as a source of timely information than it does in other roles in the MEO. The school employees report that the information from the District Office is available when it's needed close to "some" (3) of the time. For the employees in the restaurant, the Chief Executive Officers and staff are only getting the information to the employees a "little" (2) bit of the time. It is interesting to note that the school employees perceive there is a lack of information coming from the District Office, yet, what comes through does so in a timely manner. On the other hand, the MRC employees perceive that the top management personnel do not send

enough information and it usually does not arrive on time or when needed.

(Insert Table 8 here)

Organizational Communication Relationships

There are 19 items in the relationship scale. The item stem for these items is: "The extent to which each of the following relationships is true." Instructions indicate that, "A variety of communicative relationships exist in organizations like your own. Employees exchange messages regularly with supervisors, subordinates, co-workers, etc. Considering your relationships with others in your organization, please mark your response which best describes the relationship in question."

Porter (1979) reports an Alpha reliability of .90 for this subscale. He says, however, "Although the Alpha reliability of .902 is substantial, PIAS also revealed that this reliability might be improved by the separate scoring of certain items. Specifically, factor analysis of these items might reveal a "hidden" substructure. For example, items describing relationships with top management correlate only modestly with other items yet correlate strongly with each other." (p. 8)

The greatest difference between the organizations occurred among the last four items on the scale. Previous work (Ehua, 1981 and Spiker, 1980) indicates that these four items generate a separate factor on this scale. In the Variable organization, employees generally feel that they have greater impact on the organization than do employees in the Routine organization. For example, significant differences occurred between the two anchor organizations on the item "My organization encourages differences of opinion." (see Table 9) The Variable organization had a mean of 3.35 and the Routine organization's mean was 2.79, with the Comparable organization having a mean of 3.00. One other significant difference in the anchor organizations focused on the employee's impact on the organization including: "I have a say in

decisions that affect my job" (Variable $\bar{x}$ = 3.44, Routine $\bar{x}$ = 2.82, and Comparable $\bar{x}$ = 2.74).

(Insert Table 9 here)

In the Routine organization, the areas of greatest satisfaction were: "I trust my immediate supervisor" ($\bar{x}$ = 4.26), "My immediate supervisot is honest with me" ($\bar{x}$ = 4.15), and "I am free to disagree with my immediate supervisor" ($\bar{x}$ = 4.00). For the Comparable organization, responses across all agency personnel averaged 4.0 or more for items pertaining to the extent to which one trusts one's co-workers, is candid with co-workers and feels a "freedom to discuss agency matters with supervisor." The variable of greatest concern across all three organizations is the amount of praise employees receive from their bosses. The means of this question, "My supervisor praises me for a good job," were: Variable $\bar{x}$ = 3.21, Routine $\bar{x}$ = 3.00, and Comparable $\bar{x}$ = 3.00. The implication is that the Variable organization has higher morale -- since the process and technology are still being defined there is greater opportunity to have a significant effect on your company's products.

Organizational Outcomes

There are nineteen items in this scale. The item stem for these items is: "The extent to which each of the following relationships is true." Porter (1979) reports an Alpha reliability of .90 for this scale. When examining significant T-tests between the anchor organizations, there are several questions on this scale that confirm previous findings: "My opportunity to 'make a difference'" (Routine $\bar{x}$ = 3.00, Variable $\bar{x}$ = 3.46, and Comparable $\bar{x}$ = 3.12), "My organization's concern for its members' welfare" (the Routine organization's $\bar{x}$ = 2.82 and the Variable organization's $\bar{x}$ = 3.45). Clearly, the Variable organization is doing a better job of demonstrating concern for its employees. Since the employees of the

Variable organization must be in constant contact with one another so that as technology develops the information can spread to the employees as quickly as possible, it seems likely that more information would be viewed positively. The employees in the Variable organization view the "overall efficiency of operation" ($\bar{x}$ = 3.44) lower than in the Routine organization ($\bar{x}$ = 3.52).

(Insert Table 10 here)

These results tend to reinforce the difference between an organization with a routine process and well-understood outcome compared with an unstable and varied technology.

Channels of Communication

In looking at the eighth, and last, section of the Questionnaire Survey, there is a return to the receive/need categories of the first four sections. The last section assesses information received from a specific channel compared with the perceived need for information from that channel. The channels listed include face-to-face communication between two people, the telephone, bulletin boards, internal publications, and external media. As in a definition of communication, channels are the medium by which the message is carried from the originating source to the intended receiver.

The overall mean for information received from these channels is 3.07, with 3.24 reported as the mean for information needed. Within the school environment there is only one channel that suggests a significant ($p<.01$) need for more frequency of information to be exchanged. The need for increased "face-to-face contact among more than two people" was reported at 3.73 while the level of received information was 3.35. Statements that reported low levels of received and needed information were channels one might assume would be less utilized in an educational institution--the telephone and bulletin boards. More logical

channels that reported high, but non-significant, levels were face-to-face contact between two people, written memos and internal publications.

(Insert Table 11 here)

Channels in the Comparable organization function to facilitate rapid communication between parts of the agency. Premised upon the nature of the health care environment, channels in use (or in need of more use) tend to be telephones, written memos, and face-to-face communication among two or more people. With report levels ranging from 1.98 to 3.24 for information received to 2.20 and 3.60 for information needed, the accessibility of the channels varies widely. Agency employees reported high utilization of the telephone, more moderate use of the written media and fairly extensive use of face-to-face contact.

Finally, the Routine organization identifies written channels as those significantly ($p<.01$) in need of increased output. Employees received written memos as a level of just above "little" while desiring written information at a level of almost 3 or "some." A look at internal publications reveals a similar trend--the employees receive "little" in the way of internal publications and desire a level of close to "some" or 3. With an overall mean of 2.83 for information received from the channels and a mean of 3.30 for information needed, the level of information desired from the written channels is not unreasonable. Channels reporting with above average levels of response (greater than 3 or "some") are those involving interpersonal interaction: "face-to-face between two people" and "face-to-face among two or more people." (See Table 11)

The final comparison between the organizations at each end of the continuum indicates there are significant differences in the channels that provide information to the personnel of the two organizations. The employees in the Routine organization receive significantly ($p<.05$) more of their information from "face-to-face contact among more than two people," "the telephone," and "bulletin

boards" than do the employees in the Variable organization.

(Insert Table 12 here)

These results are consistent with the policies and procedures in many Routine organizations where information is communicated to small groups of workers or by postings on bulletin boards throughout the organization. They are also consistent with the earlier results that the MRC employees communicated with their co-workers at satisfactory levels. Thus, the authors assert that the structure of the organization and the routinization of the job promote the increased use of telephones, bulletin boards, and face-to-face interaction as more efficient channels of communicating information to the employees of a Routine organization.

The school, on the other hand, receives more of its information in a written form than do the restaurant employees. The "written memo or letter," "internal publications," and "external media" are all more significant ($p<.01$) sources of information for the MEO than for the MRC. (Table 12) The use of written media as channels of communication does not seem unusual in an educational organization where incredible amounts of paper regularly move throughout the organization. What is worth noting is that the MEO employees perceive a need for more information from the same channels: written memos, internal publications, and external media. (Table 12) The levels of perceived need are significantly ($p<.05$) higher than those of the employees of the Routine organization. The authors suggest that the variable nature of the organization results in an increased need for, and dependence upon, written materials. These written materials may be an attempt to document the path taken by the organization as it develops is technology and generates its outcomes. The employees may feel that if something is written down there is less uncertainty about it. The use of the external media parallels this need to document the organization's progress. The information communicated about the

organization in the external media may provide both closure for what is happening and reinforcement for the role of the organization in society. For the Routine organization, the external media may simply function as channels for advertising about the products of the company and not as important channels of information. It is possible that the Variable organization may be characterized by its more overt dependence on written channels of information and the Routine organization by its ability to use less formal, more direct methods, to communicate information.

Conclusions

Perrow's scheme for classifying organizations suggests a continuum based on an organization's technology and raw materials. At one end of the continuum an organization's technology has few exceptions, is logical and analytical, and its raw material is well understood. This organization is characterized as stable and routine and represented in this study as a restaurant organization. At the other end of the continuum are organizations whose technology has many exceptions and is unanalytical while using raw materials that are not well understood. This type of organization was represented in this study by an educational institution.

In this instance there were significant differences between the two organizations at either end of the continuum lending support to the contention that organizational structure and outcome has an impact on internal communication processes.

In the Routine organization, where there is little change in technology or process, employees perceive that they receive and send significantly more information about a variety of job-related topics than employees in the Variable organization where technology and raw materials are in a constant state of flux. Employees in the Variable organization perceive that they need more information flow than is present in the Routine organization. This research does not measure actual amount of information disseminated but rather the perceived need for more

than is presently being sent regardless of that current amount. Until the technology becomes more routine and the raw material more analyzable, it is likely that employees in a Variable organization will continue to perceive an inadequate amount of information. As employees continue to seek ways to make their job more understandable, they will continue to seek additional information about that job. The Routine organization receives more information from immediate supervisors, departmental meetings, and through the grapevine than the Variable organization receives.

The channels of information used by the two types of organizations are significantly different. The Routine organization receives more information in face-to-face interactions, on the telephone, and the bulletin board than the Variable organization, while the Variable organization receives more information through a variety of written channels (i.e., internal publications, external publications, organizational written memos, etc.). Since the Variable organization used in this research was an educational institution, this may be indicative of educators, that they use written communication channels more frequently than oral channels.

Finally, the Variable organization employees perceive that while they receive and send less information than the Routine organization, they also feel that they have greater impact on decision making, that the organization encourages a difference of opinion, that their input makes a difference, and that the organization is concerned about their welfare. When the technology is still variable and the raw materials under constant review and revision, communication processes and interactions take on more importance. Employees can see that their contributions to the organization do help effect change in process and outcome, thus morale may be higher.

A clearer understanding of how the organizational structure affects communication interactions will not necessarily lead to restructuring the organization but rather creative ways of disseminating information in a Variable organization and greater input from employees in a Routine organization.

There are unique qualities about the structure and/or nature of the organizational technology that will influence the communication system. We should expect that the structure and technology of an industrial organization, for example, will change the information flow as compared to the structure and technology of an educational organization. This research suggests that Perrow's paradigm provides a useful tool for analyzing and interpreting communication audit data from technologically diverse organizations.

ENDNOTES

1. The following individuals served as research investigators for the three audits:

   Midwest Health Agency: Robert S. Goyer, Project Director; Richard Hunter, Co-Director; Linda Avedon, Barbara Brunner, Diane Casbolt, Tom Daniels, Sergio Fraga, James Gossett, Essien Ikpe, Aulkarnia Mess, Brenda Taylor.

   Midwest Education Organization: Sue DeWine, Project Director; Linda Aronovsky, Bud Bayless, John Cassese, Bee-Ling Chua, Festus Ekere, Terry Hogan, Mary Kerns, Kay Pietscher, Meg Sondey, Walt Steward.

   Midwest Restaurant Chain: Anita James, Project Director; Nenna Davis, Cathy Figg, Jud Hannum, Todd Imahori, Ali Kanso, Linda Lay, Val Perotti, Jim Schnell, Connie Selby, Tim Snyder, John Ullman, Judy Yorde, Fahed Zainy.

TABLE 1

Information Received v. Information Needed
Within Each Anchoring Organization

Organization	Statement	Mean Received	Mean Need	T-value	Degrees of freedom	Two-tailed probability
Midwest Educational Org.	How company decisions are made that affect my job	2.87	3.71	-4.13	54	p<0.01
	Specific problems faced by the District Office	2.38	3.24	-5.38	57	p<0.01
	How I am being judged	2.91	3.52	-2.93	57	p<0.01
	How my job related problems are being handled	2.96	3.55	-2.83	54	p<0.01
Midwest Restaurant Chain	How company decisions are made that affect my job	2.77	3.37	-3.33	85	p<0.01
	Promotion & advancement opportunities in my organization	2.58	3.34	-4.32	84	p<0.01
	How I am being judged	2.94	3.54	-3.12	84	p<0.01

TABLE 2

Information Received v. Information Needed
Between the Anchoring Organizations

Type of Information	Statement	MEO Mean	MRC Mean	T-value	Degrees of freedom	Two-tailed probability
Received	My job duties in the organization	3.17	3.83	3.99	148	p<0.01
	Specific problems faced by management/administration	2.35	3.18	4.28	149	p<0.01
Needed	Mistakes or failures of my organization	3.22	2.64	-2.81	145	p<0.01
	Important new product, service or program developments in my organization	3.68	3.29	-2.10	145	p<0.05

TABLE 3

Information Send v. Information Need to Send
Within Each Anchoring Organization

Organization	Statement	Mean Send	Mean Need Send	T-value	Degrees of freedom	Two-tailed probability
Midwest Educational Org.	Evaluating the performance of my immediate supervisor	2.18	2.90	-4.04	50	$p<0.01$
	Reporting job related problems	3.08	3.37	-2.18	50	$p<0.05$
	Reporting what I am doing in my job	2.73	3.10	-2.44	48	$p<0.05$
Midwest Restaurant Chain	Evaluating the performance of my immediate supervisor	2.73	3.19	-2.45	87	$p<0.05$

TABLE 4

Information Send Between the Anchoring Organizations*

Type of Information	Statement	MEO Mean	MRC Mean	T-value	Degrees of freedom	Two-tailed probability
Send	Reporting what I doing in my job	2.75	3.37	3.32	143	$p<0.01$
	Reporting what I think my job requires me to do	2.65	3.46	4.11	144	$p<0.01$
	Reporting job related problems	3.04	3.55	2.72	143	$p<0.01$
	Requesting information necessary to do my job	2.93	3.40	2.41	145	$p<0.05$
	Evaluating the performance of my immediate supervisor	2.27	2.78	2.28	144	$p<0.05$

*No significant differences are reported for "Information Need to Send"

TABLE 5

Information Follow-up v. Information Follow-up Needed
Within Each Anchoring Organization

Organization	Statement	Mean Now	Mean Needed	T-value	Degrees of freedom	Two-tailed probability
Midwest Educational Org.	District Office	2.36	3.42	-5.19	42	$p<0.01$
Midwest Restaurant Chain	Chief Executive Officer and staff	2.25	2.99	-3.47	79	$p<0.01$

TABLE 6

Sources of Information Received v. Information Needed
Within Each Anchoring Organization

Organization	Statement	Mean Received	Mean Need	T-value	Degrees of freedom	Two-tailed probability
Midwest Educational Org.	Co-workers in my own building	3.19	3.54	-2.17	51	$p<0.05$
	Co-workers in other buildings	1.98	3.21	-7.03	51	$p<0.01$
	Immediate supervisor	3.17	3.66	-2.53	52	$p<0.05$
	Department meetings	2.77	3.37	-2.87	42	$p<0.01$
	District Office	2.09	3.21	-5.43	42	$p<0.01$
Midwest Restaurant Chain	Subordinates	2.54	2.96	-2.01	45	$p<0.05$
	Co-workers in other stores	1.92	2.54	-3.95	75	$p<0.01$
	Middle management	2.39	3.29	-5.23	79	$p<0.01$
	Formal management presentations	2.36	3.10	-4.38	72	$p<0.01$
	Chief Executive Officer and staff	2.04	2.99	-5.18	77	$p<0.01$

TABLE 7

Sources of Information Received v. Information Needed
Between the Anchoring Organizations

Type of Information	Statement	MEO Mean	MRC Mean	T-value	Degrees of freedom	Two-tailed probability
Received	Immediate supervisor	3.20	3.63	2.42	145	$p<0.05$
	Department meetings	2.82	3.30	2.03	124	$p<0.05$
	Formal management presentations	3.16	2.36	-3.75	121	$p<0.01$
Needed	Co-workers in other buildings/stores	3.21	2.56	-2.89	127	$p<0.01$

TABLE 8

Sources of Timely Information Between the Anchoring Organizations

Statement	MEO Mean	MRC Mean	T-value	Degrees of freedom	Two-tailed probability
Immediate supervisor	3.34	3.71	2.13	138	$p<0.05$
District Office/ Chief Executive Officer and staff	2.76	2.05	-3.23	122	$p<0.01$

TABLE 9

Organizational Communication Relationships Between the Anchoring Organizations

Statement	MEO Mean	MRC Mean	T-value	Degrees of freedom	Two-tailed probability
My organization encourages differences of opinion	3.35	2.79	-2.83	138	$p<0.01$
I have a part in accomplishing my organization's goals	3.44	2.82	-2.97	144	$p<0.01$

TABLE 10

Organizational Outcomes Between the Anchoring Organizations

Statement	MEO Mean	MRC Mean	T-value	Degrees of freedom	Two-tailed probability
My opportunity "to make a difference"	3.46	3.00	-2.45	140	$p<0.05$
My organizations' concern for its members' welfare	3.45	2.82	-3.61	142	$p<0.01$
The overall quality of my organizations' product or service	3.85	4.18	2.36	140	$p<0.05$

TABLE 11

Channels of Communication Received v. Communication Needed Within Each Anchoring Organization

Organization	Statement	Mean Received	Mean Need	T-value	Degrees of freedom	Two-tailed probability
Midwest Educational Org.	Face-to-face contact among more than 2 people	3.35	3.73	-2.54	54	$p<0.01$
Midwest Restaurant Chain	Written (memos, letters, etc.)	2.34	2.83	-3.35	85	$p<0.01$
	Internal publications (newsletters, magazines, etc.)	2.17	2.71	-4.01	82	$p<0.01$

TABLE 12

Channels of Communication Received v. Communication Needed
Between the Anchoring Organizations

Type of Information	Statement	MEO Mean	MRC Mean	T-value	Degrees of freedom	Two-tailed probability
Received	Face-to-face contact among more than 2 people	3.37	3.70	2.23	144	$p<0.05$
	Telephone	2.52	2.94	1.96	142	$p<0.05$
	Written (memos, letters, etc.)	3.14	2.37	-3.93	143	$p<0.01$
	Bulletin boards	2.42	3.17	3.58	139	$p<0.01$
	Internal publications (newsletters, magazines, etc.)	3.26	2.15	-5.32	137	$p<0.01$
	External media (TV, radio, newspapers)	3.07	2.09	-4.98	140	$p<0.01$
Needed	Written (memos, letters, etc.)	3.30	2.83	-2.31	137	$p<0.05$
	Internal publications (newsletters, magazines, etc.)	3.44	2.71	-3.34	131	$p<0.01$
	External media (TV, radio, newspapers)	3.16	2.27	-4.27	134	$p<0.01$

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